

**AYK Region
Norton Sound/Kotzebue
Salmon Escapement
Report # 45**

1986 Kwiniuk River Salmon Counting Tower

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INTRODUCTION

The Kwiniuk River drains into Norton Sound at Moses Point approximately 100 miles east-northeast of Nome. A salmon counting tower has been operated annually on this system since 1965. This long term data base makes this project a valued management tool.

OBJECTIVES

1. Obtain daily and seasonal timing and magnitude of salmon escapement.
2. Determine age, sex, and size composition of the Moses Point commercial chum catch.

METHODS

Tower Counts

The Kwiniuk River tower camp is on Hans Jemewouk's native allotment, approximately 4 miles upstream from Moses Point, which is leased to ADF&G on an annual basis.

A 20 foot tower was erected at the same site as in the past five years (Figure 1). The tower was guyed by ropes. Boards and plywood were used as footings. To provide a low center of gravity, sand bags were placed on boards set across the lowest rungs of the metal scaffolding tower.

A 50 foot vinyl canvas flash panel was placed on the river bottom directly in front of the tower and angling slightly downstream. The panel was tied to an aircraft cable along its upstream edge. Metal fence posts with 3 sand bags secured to each post were used to weight the panel down to prevent fish from moving under or spooking away from the panel.

A weir was built from the midstream end of the flash panel up onto the bank opposite the tower to assure fish migration over the flash panel. The weir was made of aluminum conduit pickets, aluminum angle stringers, and steel pipe stanchions.

A car headlight was used to illuminate the flash panel during dark periods. The light was mounted in a metal gas can secured to the tower about 12 feet above the water.

The counting schedule began June 19 and ended July 26. The crew counted 18 hours each day from 12 noon to 6 a.m. except on Mondays when they counted 24 hours and Sundays which they were given off. The daily counts considered in this report ran from 12 midnight to 11:59 p.m. the following night. The crew radioed the updated counts in on a daily basis to the management biolo-

gist who kept a running table similar to Table 1. This can be compared to the appendix tables to track the progress of both pink and chum salmon escapements.

The expanded counts in this report were calculated by first assigning a value for all missed hours during the standard 18 hour count. This is done by finding the mean of the two nearest daily counts of the missing time block. If more than one hour is missing then an equal number of hours on either side of the missing block is used to find a mean for the missing block.

Once the 18 hour counts are adjusted they are expanded to 24 hour counts. In general, this expansion is derived by adding a factor to the 18 hour count to compensate for salmon migration during the 6 hour time block not normally counted. The factor is a proportion: the number of salmon counted from 6 a.m. to noon (during the 24 hour count) divided by the 18 hour count (from the same 24 hour count day). Each 18 hour count is then expanded to a 24 hour count by multiplying the appropriate expansion factor by the actual 18 hour count of salmon (Tables 4 to 6).

Catch Sampling

The Moses Point Co-op did not operate again during 1986. Commercial catch samples were obtained by the crew leader during the 1986 season at Moses Point Camp and Caches Camp from commercial fishermen who had not yet sold their catches. Occasionally the crew was able to catch a ride out to the Japanese processing vessel, Fukuyoshi Maru #85, to collect samples.

Chum salmon scale samples were also collected from the Kwiniuk River. The majority of the samples were collected from local subsistence fishermen, whom the crew contacted or accompanied on fishing trips.

Aerial Surveys

There were two aerial surveys of the Kwiniuk River flown this year. The first survey was made on the portion of the river below the tower on June 20, the second day of counting.

The second survey was flown on June 28. This survey covered the lower 10 miles of river.

The Tubutulik River was surveyed 3 times in response to the low escapement in the Kwiniuk River. The first survey took place on June 20 and covered the lower 5 miles of river, the second was on June 28 and extended 10 miles upstream and the last covered 48 miles of river on July 14.

RESULTS

Tower Counts

The unexpanded counts were 469 chinook, 421 coho, 192,206 pink, and 19,596 chum salmon. Tables 1, 2, and 3 show the hourly counts of chinook, chum and pink salmon, respectively. Expanded counts are shown in Tables 4, 5, and 6. Figures 1, 2 and 3 show expanded salmon counts by date. Figure 4 displays the water temperature and water level by date.

Catch Sampling

Commercial catch sampling results are shown in Table 7. No chinook salmon samples were obtained. A total of 279 chum salmon samples were obtained, of which 222 were aged. The commercial chum salmon sampling goal of 450 was not met in 1986 due to decreased crew size (from 3 to 2 members), and a commercial fishery closure which occurred from July 14 through July 28.

The commercial chum salmon samples consisted of an unusual age class composition. During most years nearly two-thirds of the Moses Point commercial chum salmon samples are age 4-1 (Gilbert-Rich), with age class 5-1 comprising nearly all of the remaining one-third. In 1986, just 49.1% were age 4-1, 42.8% were age 5-1, and 7.7% were age 3-1 (Table 7). A strong showing of chum salmon during the early portion of the Moses Point fishery, with a rapid decline into a return which just trickled in during mid to late July seemed to indicate inseason that a weaker than normal return of age 4-1 fish had occurred.

The sampling goal of 450 escapement or beach seine samples of chum salmon from the Kwiniuk River was not met. Of the 47 samples obtained, 43 were aged. This small sample consisted of 86.1% age 4-1 and 13.9% age 5-1 chum salmon (Table 8). While it is recognized that the sample is small, it suggests that the commercial fishery did catch proportionally more 5 year old fish than normal, resulting in a proportionally higher escapement of the later returning 4 year old fish. No samples of chum salmon were obtained from the Tubutuluk River.

Aerial Surveys

The first aerial survey of the Kwiniuk River was made on June 20 to insure no salmon had migrated past the tower site prior to its operation. No salmon were seen in the river.

The only other survey flown in 1986 on the Kwiniuk River occurred on June 28. On that survey 780 chum and 40 pink salmon were counted, much less than the tower counts on that day.

The Tubutulik River was surveyed on the same days as the Kwiniuk River. The first survey counted no fish and the second 1,335 chum and 345 pink salmon all in the lower 10 miles of the river. A third survey was flown on the Tubutulik on July 14, when 5,975 chum and 35,680 pink salmon were observed. The July 14 chum count was low compared to the historical data base.

DISCUSSION

Based on the low chum salmon escapement indicated by the July 14 aerial survey of the Tubutulik River and the tower counts of the Kwiniuk an emergency order was issued to close the Moses Point Subdistrict effective July 14. Salmon fishing remained closed until July 28 when the chum salmon migration was judged to be over and the coho salmon migration was underway as indicated by the Kwiniuk River tower counts.

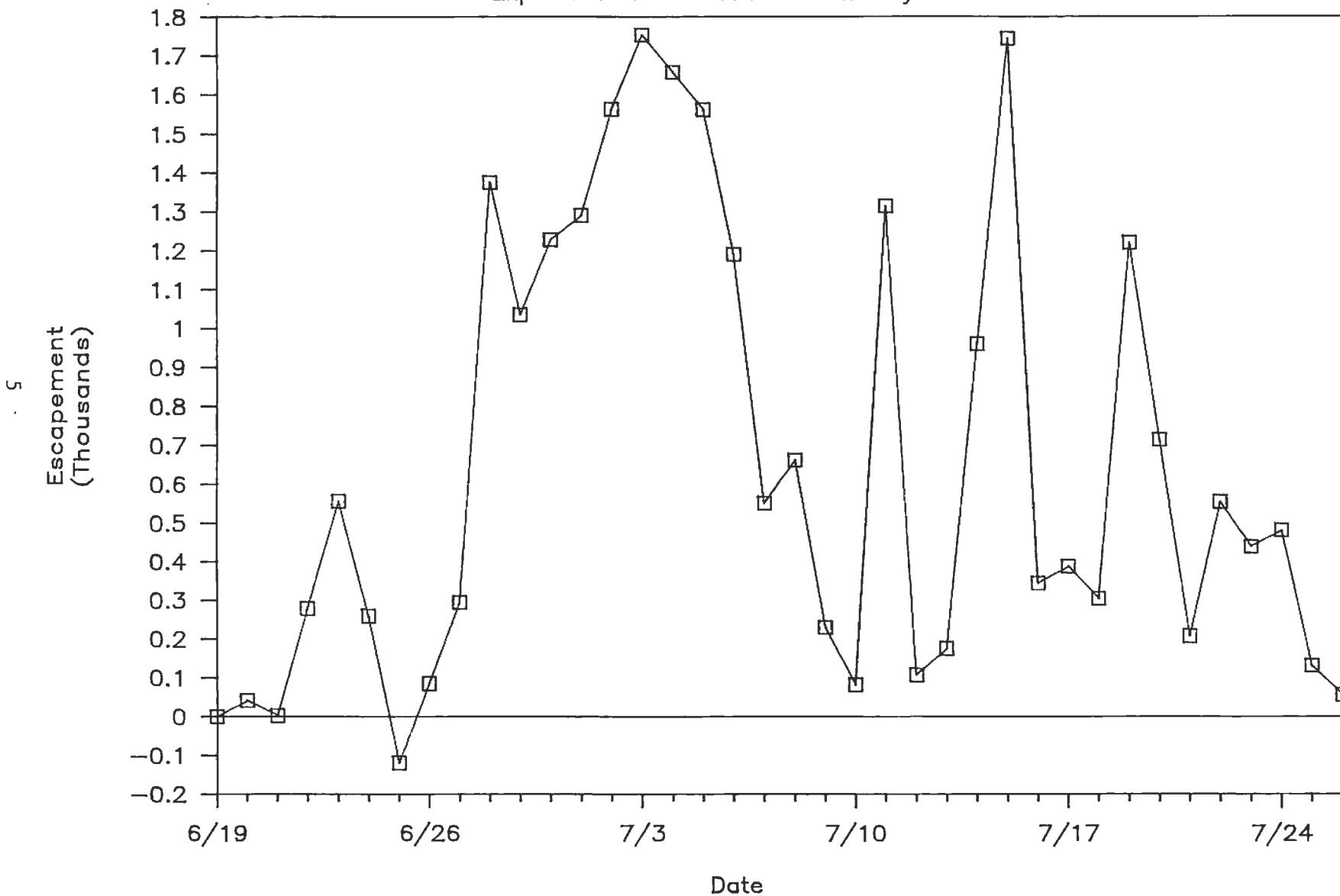
Weather prevented aerial surveys after July 14. Without the Kwiniuk River tower escapement index it would have been more difficult to have reduced the chum season by roughly one-third to meet the escapement goal. KEG Fisheries representatives, various fishermen, and a foreign processor representative all questioned the decision and several of these people requested the governor look into the matter.

The long term nature of the project (21 years) and the continued heavy fishing pressure in this subdistrict both indicate the value of this project.

1986 Kwiniuk Tower

Figure 1.

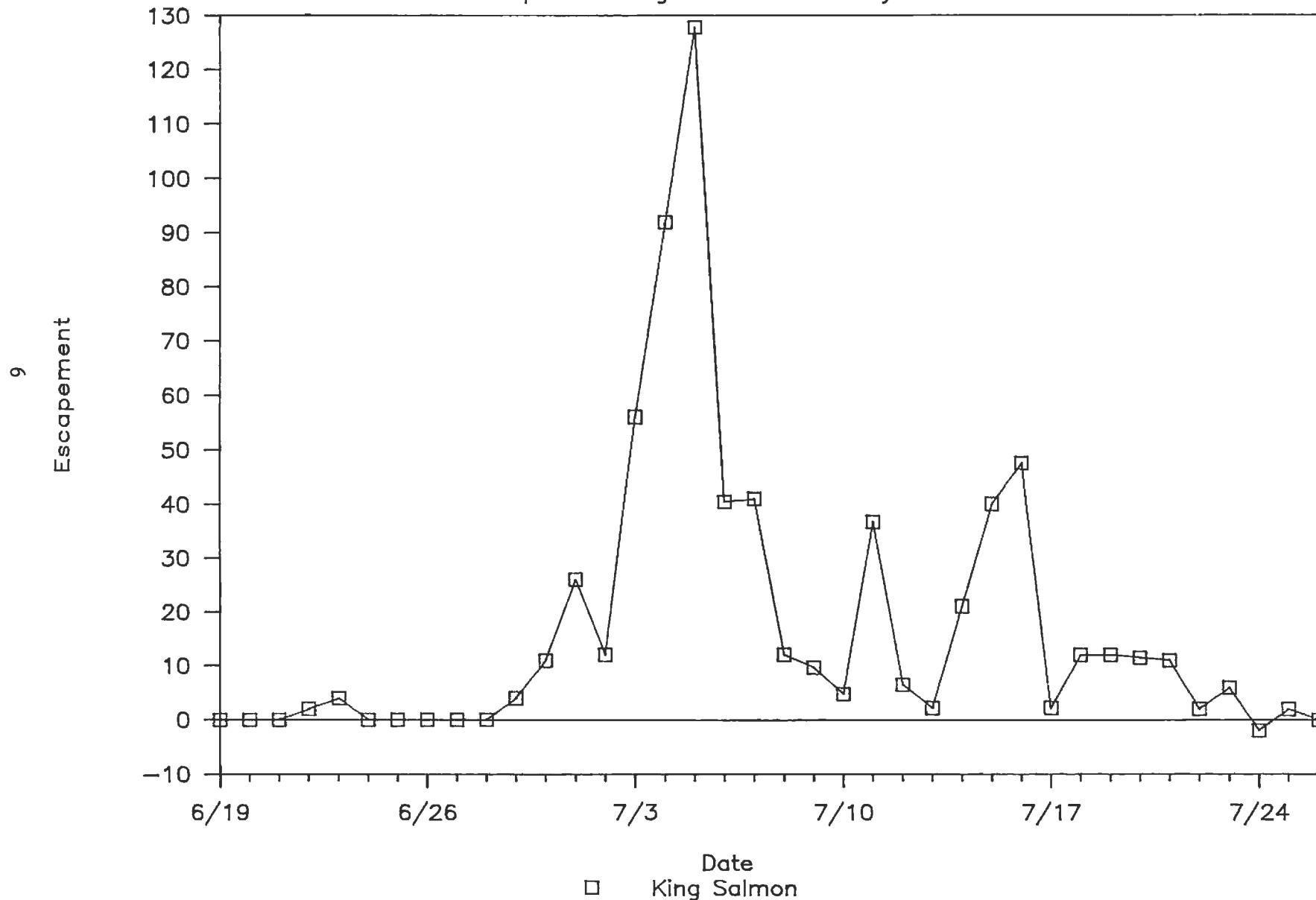
Expanded Chum Salmon Counts by Date



1986 Kwiniuk Tower

Figure 2.

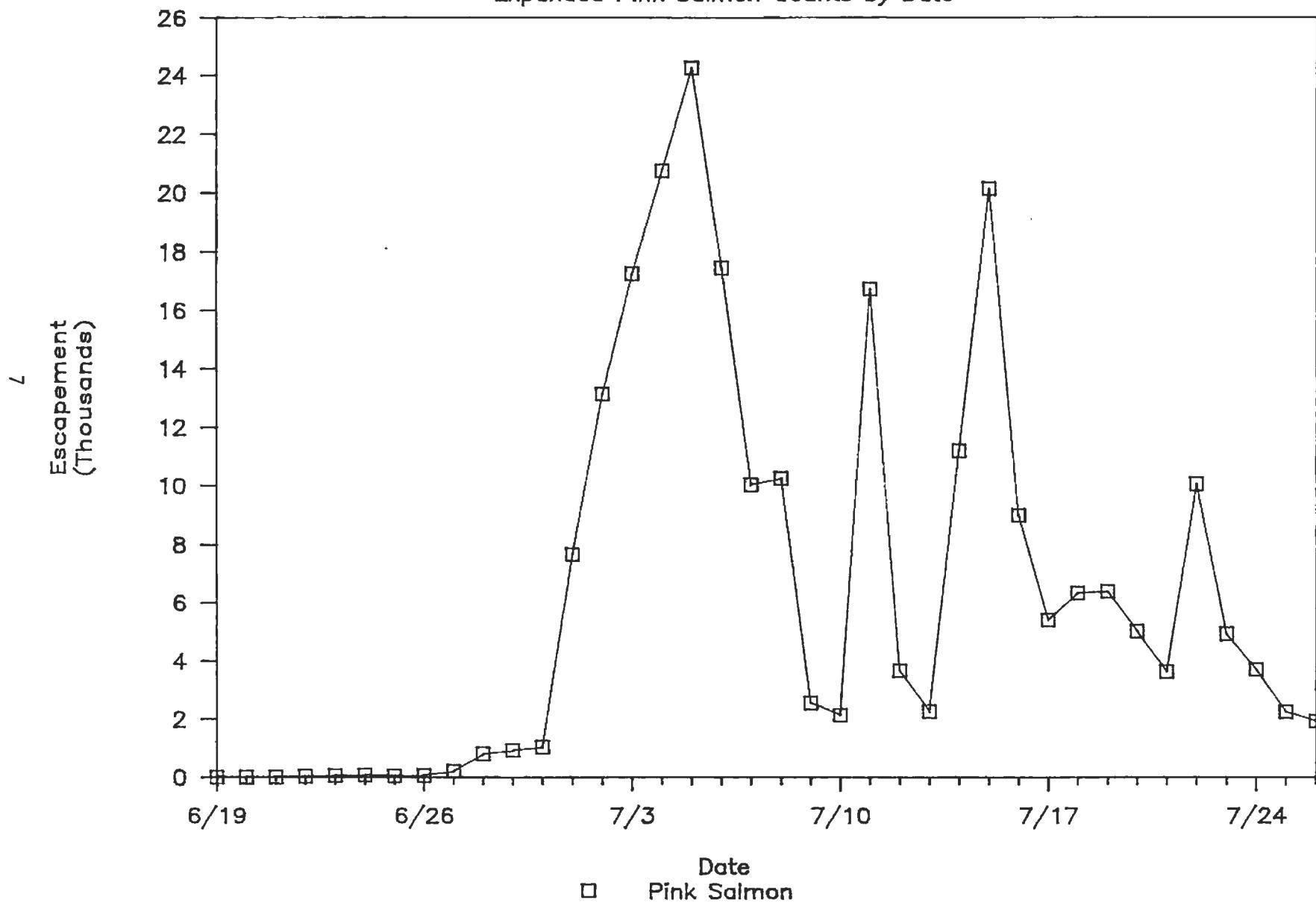
Expanded King Salmon Counts by Date



1986 Kwiniuk Tower

Figure 3.

Expanded Pink Salmon Counts by Date



1986 Kwiniuk Tower

Figure 4.

Water Level and Temperatures by Date

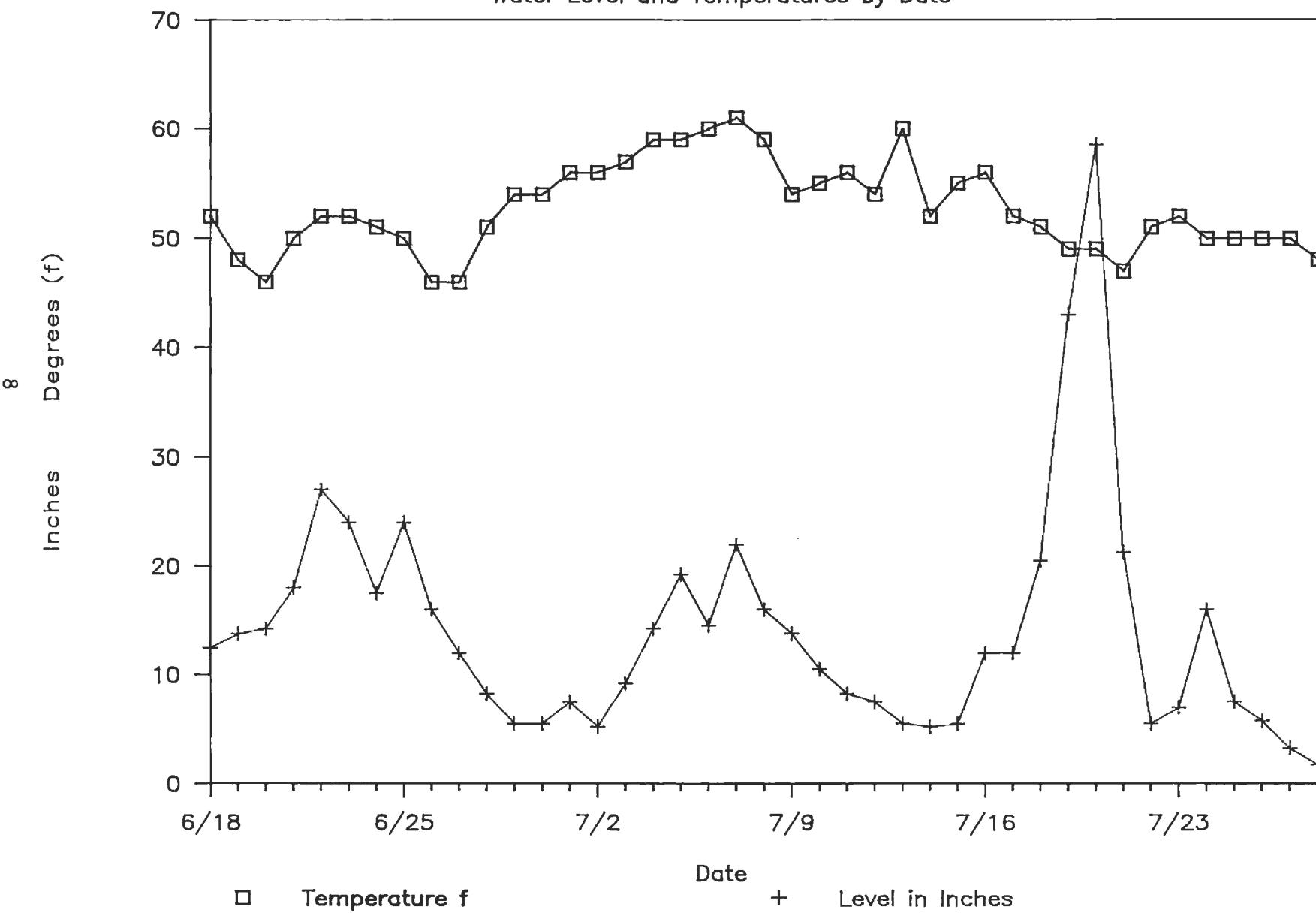


Table 1. Daily hourly chum salmon migration past Kwiniuk River counting tower, 1986.

DATE	HOUR	TOTAL																								%	
		0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300		
6/19																											0
6/20	0	0	0	0	0	0	0								0	0	0	0	0	0	0	0	0	0	0	0	42 0.214
6/21	0	0	0	0	0	0	0								0	0	0	0	0	0	0	0	0	0	0	0	2 0.010
6/22																											0 0
6/23	0	0	61	29	3	0	0	0	0	0	0	0	0	0	0	0	33	28	79	90	93	5	31	70	34	556 2.837	
6/24	14	6	0	2	6	6								-2	0	0	-78	-14	20	52	66	108	4	54	14	258 1.316	
6/25	18	38	20	26	0	-4								6	-74	-92	-14	-62	24	-88	46	-10	48	8	-10	-120 -0.61	
6/26	-4	12	-4	12	0	-2								-28	0	0	0	0	0	0	34	18	28	-26	44	84 0.428	
6/27	44	-10	-2	0	6	2								0	0	0	0	0	0	0	20	50	34	4	144	292 1.490	
6/28	72	144	112	20	36	38								4	4	0	118	0	18	14	162	50	54	512	1362 6.950		
6/29	72													0												122 202 1.030	
6/30	47	159	171	55	58	40	11	0	0	1	0	0	-29	12	9	4	10	3	200	63	18	15	53	328	1228 6.266		
7/1	350	132	82	120	24	22								0	0	0	0	0	0	0	0	4	262	222	60 1278 6.521		
7/2	98	242	136	204	48	42								0	4	0	2	16	4	8	6	14	66	396	262 1548 7.899		
7/3	142	130	98	182	162	74								0	2	0	0	2	16	8	72	48	244	172	384 1736 8.858		
7/4																										0 0	
7/5	70	182	444	464	34	12								8	12	28	26	30	32	10	12	60	10	10	16	1460 7.450	
7/6	62	30	8	52	22									2	0	0	22	56	26	86	26	322	88	208	58 1068 5.450		
7/7	31	23	13	28	12	13	14	4	0	7	4	4	8	8	49	44	30	48	106	61	5	3	4	32 551 2.811			
7/8	20	90	22	4	2	42								-2	12	4	6	-4	22	132	194	44	24	6	4 622 3.174		
7/9	4	6	0	-4	0	0								0	0	-2	2	2	6	2	8	118	20	22	32 216 1.102		
7/10	46	8	0	0	-2	0								0	0	-2	2	0	0	-2	4	4	0	4 14 76 0.387			
7/11	76	200	50	6	2	0								2	2	0	0	12	36	20	294	70	154	340	42 1306 6.664		
7/12	16	16	4	8	8	4								0	-2	-10	0	-22	0	20	6	8	30	20	0 106 0.540		
7/13	-6	6	0	10	10	2								0	0	0	0	2	0	10	8	18	22	16	76 174 0.887		
7/14																									0 0		
7/15	5	16	48	92	21	36	4	3	0	0	2	3	4	2	9	11	33	-1	96	165	553	304	238	100 1744 8.899			
7/16	32	14	0	0	8	2								18	0	16	24	42	28	-2	28	-10	14	108	18 340 1.735		
7/17	22	12	16	12	0	2								-2	0	0	0	6	0	6	16	20	154	120 384 1.959			
7/18	18	70	78	12	2	0								2	4	2	0	2	-2	10	4	2	0	70	274 1.398		
7/19	180	8	2	0	0	4								-6	2	4	16	102	84	86	174	124	228	66	28 1102 5.623		
7/20																								0 0			
7/21	9	37	10	22	7	9	4	4	10	1	1	0	0	2	-2	0	7	11	1	11	13	5	8	37 207 1.056			
7/22	42	60	48	26	20	10								0	0	2	4	64	122	42	22	20	6	12	500 2.551		
7/23	8	10	44	8	20	2								0	-2	2	2	6	22	36	54	78	36	48	22 396 2.020		
7/24	12	-2	4	4	-2	6								-8	0	2	0	18	36	6	4	40	98	96	120 434 2.214		
7/25	72	26	2	8	16	4								-2	0	0	-2	-4	2	-6	0	0	-2	4 118 0.602			
7/26	0	0	-2	-10	-4	0								0	0	-2	6	0	2	14	10	2	4	12	18 50 0.255		
TOTAL	1510	1697	1487	1348	549	388	33	11	10	9	7	7	-25	-12	19	108	424	592	1037	1541	1906	1862	2371	2717	19596 100		
%	7.705	8.659	7.588	6.878	2.801	1.979	0.168	0.056	0.051	0.045	0.035	0.035	-0.12	-0.06	0.096	0.551	2.163	3.021	5.291	7.863	9.726	9.501	12.09	13.86	100 19596		

Table 2. Daily hourly king salmon migration past Kwiniuk River counting tower, 1986.

DATE	HOUR	TOTAL																								%	
		0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300		
6/19																											0.00
6/20	0	0	0	0	0	0	0																			0.00	
6/21	0	0	0	0	0	0	0																			0.00	
6/22																											0.00
6/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	4 0.85
6/24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.00
6/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.00
6/26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.00
6/27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.00
6/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.00
6/29	0																										0 0.00
6/30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	3	3	11	2.35	
7/1	8	10	0	0	0	0	4														0	0	2	2	26	5.54	
7/2	4	4	2	0	0	0	0														0	0	6	-4	12	2.56	
7/3	2	6	-2	0	0	4														4	6	2	26	56	11.94		
7/4																										0 0.00	
7/5	24	12	38	8	10	0																				106 22.60	
7/6	-2	4	0	0	0	0																				20 4.26	
7/7	3	5	4	5	0	4	1	0	0	4	1	1	0	2	3	3	1	0	-2	2	2	0	0	1	3	41 8.74	
7/8	-2	4	2	0	0	0																				10 2.13	
7/9	0	0	0	0	0	0																				8 1.71	
7/10	0	0	0	0	0	0																				4 0.85	
7/11	0	16	2	4	0	0																				34 7.25	
7/12	2	2	4	0	0	0																				6 1.28	
7/13	0	0	0	0	0	0																				2 0.43	
7/14																										0 0.00	
7/15	3	3	0	0	0	1	0	1	1	0	0	1	4	3	-1	1	1	0	0	0	7	7	4	40	8.53		
7/16	2	4	0	2	0	2																				10 2.44	
7/17	0	0	0	0	0	0																				2 0.43	
7/18	0	4	0	8	0	0																				12 2.56	
7/19	0	0	2	0	-2	0																				12 2.56	
7/20																										0 0.00	
7/21	0	0	2	3	2	0	0	-1	1	0	0	0	0	1	2	0	0	0	0	1	0	0	0	0	11 2.35		
7/22	0	0	0	0	0	0																				2 0.43	
7/23	0	0	0	0	0	0																				6 1.28	
7/24	0	0	0	0	0	0																				-2 -0.43	
7/25	2	0	0	2	0	0																				2 0.43	
7/26	0	0	0	0	0	-2																				0 0.00	
TOTAL	48	68	58	32	10	13	1	0	2	4	1	2	10	15	6	18	15	10	14	21	19	22	38	42	469	100.0	
%	10.23	14.50	12.37	6.82	2.13	2.77	0.21	0.00	0.43	0.85	0.21	0.43	2.13	3.20	1.28	3.84	3.20	2.13	2.99	4.48	4.05	4.69	8.10	8.96	100.0	469	

Table 3. Daily hourly pink salmon migration past Kwiniuk River counting tower, 1986.

DATE	HOUR	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	TOTAL	%	
6/19																												
6/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/22																												
6/23	3	-3	3	0	1	0	0	0	0	0	3	0	-5	0	0	6	2	5	7	6	2	6	15	13	64	0.03		
6/24	6	8	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	2	12	8	6	6	12	2	72	0.04		
6/25	6	14	14	6	0	2								2	0	-10	-6	-2	0	-2	-4	6	18	2	0	46	0.02	
6/26	4	-12	-4	0	0	0								4	0	2	-4	0	0	0	10	14	26	8	16	64	0.03	
6/27	8	-12	-12	0	2	-2								0	0	0	0	0	0	0	4	2	2	198	10	200	0.10	
6/28	56	82	62	2	6	6								10	2	0	0	14	4	-6	4	98	14	18	420	792	0.41	
6/29	192													0					8						284	484	0.25	
6/30	59	83	115	12	29	19	14	3	2	0	0	0	-10	6	6	0	1	2	85	55	32	28	51	439	1031	0.54		
7/1	1560	640	242	178	22	34								2	0	4	2	4	6	6	16	3600	1000	200	7522	3.91		
7/2	648	3040	1612	640	180	62								2	10	2	6	26	16	22	26	260	1240	2920	2190	12902	6.71	
7/3	1512	2112	1872	620	858	884								10	10	4	4	20	196	96	1236	710	2360	1260	3180	16944	8.82	
7/4																										0	0.00	
7/5	766	3074	8020	5260	420	386								10	94	154	294	562	630	520	244	1196	466	318	300	22714	11.82	
7/6	1176	518	66	218	294									4	14	38	152	710	410	1852	300	3424	1554	3210	1638	15578	8.10	
7/7	1000	348	233	45	97	215	294	136	53	27	11	61		58	63	748	720	610	557	1903	1861	228	19	247	497	10031	5.22	
7/8	466	1324	264	14	38	266								-44	12	82	36	-200	196	2088	3350	1076	496	84	106	9654	5.02	
7/9	194	94	-10	-18	-58	-46								8	0	-64	-8	-106	40	100	74	1148	372	334	360	2414	1.26	
7/10	1530	104	22	-2	-32	4								-8	-28	0	34	14	8	14	8	42	14	176	104	2004	1.04	
7/11	1332	2980	852	90	6	8								0	-2	4	2	106	400	186	4050	822	1400	3184	1030	16450	8.56	
7/12	786	656	170	38	34	22								-2	-10	-288	-10	-336	-14	380	76	296	1484	308	20	3610	1.88	
7/13	60	90	44	244	64	24								4	0	0	0	2	8	46	42	266	378	252	706	2230	1.16	
7/14																									0	0.00		
7/15	216	276	567	322	161	399	226	70	26	2	11	7	211	111	119	274	168	40	659	1862	5782	3950	2930	1762	20151	10.48		
7/16	1542	628	26	52	122	172								668	532	418	442	1066	876	94	234	-64	190	1020	834	8852	4.61	
7/17	862	270	128	76	8	78								20	18	-8	-2	104	62	84	150	650	418	1378	1000	5296	2.76	
7/18	432	1222	1642	96	14	20								12	10	18	48	42	60	576	182	100	36	28	704	5242	2.73	
7/19	1758	126	62	22	14	6								-76	-42	32	66	420	336	460	882	354	444	282	138	5284	2.75	
7/20																									0	0.00		
7/21	304	501	165	83	57	82	163	191	259	13	3	-3	5	8	40	96	95	192	95	335	320	74	152	413	3643	1.90		
7/22	900	644	428	158	82	100							-4	8	36	82	68	1062	1972	1152	476	638	360	172	8334	4.34		
7/23	208	120	122	22	24	32								42	8	28	46	120	78	500	720	872	596	336	200	4074	2.12	
7/24	242	50	64	28	14	22								28	-14	36	34	72	118	178	116	256	616	508	702	3070	1.60	
7/25	824	174	142	110	68	64								0	8	8	-12	-4	-4	4	30	76	82	158	130	1858	0.97	
7/26	26	56	-2	18	8	40								0	-2	0	10	44	134	238	214	150	130	228	304	1596	0.83	
TOTAL	17502	19865	17361	8182	2457	3193	697	400	340	42	28	65	951	816	1409	2318	3626	5428	12169	17233	18616	20657	20977	17874	192206	100.00		
%	9.11	10.34	9.03	4.26	1.28	1.66	0.36	0.21	0.18	0.02	0.01	0.03	0.49	0.42	0.73	1.21	1.89	2.82	6.33	8.97	9.69	10.75	10.91	9.30	100.00	192206		

Table 4. Expanded daily hourly chum salmon migration past Kwiniuk River counting tower, 1986.

DATE	HOUR	0000	0100	0200	0300	0400	0500	6-12	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	TOTAL	%	
6/19								\$0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6/20	0	0	0	0	0	0	0	\$0	0	0	0	0	4	22	0	16	0	0	0	0	0	42	0.170
6/21	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.008
6/22	\$0	\$0	\$31	\$15	\$2	\$0	\$0	\$0	\$0	\$0	\$0	\$17	\$14	\$40	\$46	\$47	\$3	\$16	\$35	\$17	\$279	1.129	
6/23	0	0	61	29	3	0	0	0	0	0	0	33	28	79	90	93	5	31	70	34	556	2.250	
6/24	14	6	0	2	6	6	\$0	-2	0	0	0	-78	-14	20	52	66	108	4	54	14	258	1.044	
6/25	18	38	20	26	0	-4	\$0	6	-74	-92	-14	-62	24	-88	46	-10	48	8	-10	-120	-0.48		
6/26	-4	12	-4	12	0	-2	\$0	-28	0	0	0	0	0	0	0	34	18	28	-26	44	84	0.340	
6/27	44	-10	-2	0	6	2	\$3	0	0	0	0	0	0	0	0	20	50	34	4	144	294.8	1.193	
6/28	72	144	112	20	36	38	\$13	4	4	4	0	118	0	18	14	162	50	54	512	1375.	5.567		
6/29	72	\$152	\$142	\$38	\$47	\$39	\$13	0	\$8	\$7	\$2	\$64	8	\$109	\$39	\$90	\$33	\$54	122	1035.	4.190		
6/30	47	159	171	55	58	40	12	-29	12	9	4	10	3	200	63	18	15	53	328	1228	4.970		
7/1	350	132	82	120	24	22	\$13	0	0	0	0	0	0	0	0	4	262	222	60	1290.	5.224		
7/2	98	242	136	294	48	42	\$15	0	4	0	2	16	4	8	6	14	66	396	262	1563.	6.327		
7/3	142	130	98	182	162	74	\$17	0	2	0	0	2	16	8	72	48	244	172	384	1753.	7.096		
7/4	\$106	\$156	\$271	\$323	\$98	\$43	\$55	\$4	\$7	\$14	\$13	\$16	\$24	\$9	\$42	\$54	\$127	\$91	\$204	1657.	6.708		
7/5	70	182	444	464	34	12	\$94	8	12	28	26	30	32	10	12	60	10	10	\$24	1561.	6.320		
7/6	\$51	62	30	8	52	22	\$71	2	0	0	22	56	26	86	26	322	88	208	58	1189.	4.815		
7/7	31	23	13	28	12	13	33	8	8	49	44	30	48	106	61	5	3	4	32	551	2.230		
7/8	20	90	22	4	2	42	\$40	-2	12	4	6	-4	22	132	194	44	24	6	4	661.6	2.678		
7/9	4	6	0	-4	0	0	\$14	0	0	-2	2	2	6	2	8	118	20	22	32	229.7	0.930		
7/10	46	8	0	0	-2	0	\$5	0	0	-2	2	0	0	-2	4	4	0	4	14	80.84	0.327		
7/11	76	200	50	6	2	0	\$9	2	2	0	0	12	36	20	294	70	154	340	42	1315.	5.323		
7/12	16	16	4	8	8	4	\$1	0	-2	-10	0	-22	0	20	6	8	30	20	0	106.7	0.432		
7/13	-6	6	0	10	10	2	\$1	0	0	0	0	2	0	10	8	18	22	16	76	175.2	0.709		
7/14	(\$1)	\$11	\$24	\$51	\$16	\$19	\$7	\$2	\$1	\$5	\$6	\$18	(\$1)	\$53	\$87	\$286	\$163	\$127	\$88	\$960	3.884		
7/15	5	16	48	92	21	36	12	4	2	9	11	33	-1	96	165	553	304	238	100	1744	7.059		
7/16	32	14	0	0	8	2	\$2	18	0	16	24	42	28	-2	28	-10	14	108	18	342.3	1.385		
7/17	22	12	16	12	0	2	\$3	-2	0	0	0	6	0	0	6	16	20	154	120	386.6	1.565		
7/18	18	70	78	12	2	0	\$29	2	4	2	0	2	-2	10	4	2	0	0	70	303.3	1.227		
7/19	180	8	2	0	0	4	\$118	-6	2	4	16	102	84	86	174	124	228	66	28	1219.	4.937		
7/20	\$95	\$23	\$6	\$11	\$4	\$7	\$69	(\$3)	\$2	\$1	\$8	\$55	\$48	\$44	\$93	\$69	\$117	\$37	\$33	713.4	2.887		
7/21	9	37	10	22	7	9	20	0	2	-2	0	7	11	1	11	13	5	8	37	207	0.837		
7/22	42	60	48	26	20	10	\$53	0	0	0	2	4	64	122	42	22	20	6	12	553.4	2.240		
7/23	8	10	44	8	20	2	\$42	0	-2	2	2	6	22	36	54	78	36	48	22	438.3	1.774		
7/24	12	-2	4	4	-2	6	\$46	-8	0	2	0	18	36	6	4	40	98	96	120	480.4	1.944		
7/25	72	26	2	8	16	4	\$13	-2	0	0	-2	-4	2	-6	0	0	-2	4	130.6	0.528			
7/26	0	0	-2	-10	-4	0	\$5	0	0	-2	6	0	2	14	10	2	4	12	18	55.34	0.224		
TOTAL	1760.	2038	1960	1785	714.5	495.5	\$828	-22	6	45	153	590	702.5	1297.	1847	2406.	2316.	2714.	3066.	24704	100		
%	7.126	8.249	7.933	7.225	2.892	2.005	3.352	-0.08	0.024	0.182	0.619	2.388	2.843	5.252	7.476	9.741	9.376	10.98	12.41	100	24704		

Note: \$ equals calculated value

Table 5. Expanded daily hourly king salmon migration past Kwiniuk River counting tower, 1986.

DATE	HOUR																								
		0000	0100	0200	0300	0400	0500	6-12	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	TOTAL	%			
6/19																									
6/20	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/21	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/22									\$0	\$0	\$0	\$0	\$0	\$0	\$1	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	2	0.31
6/23	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	4	0.61
6/24	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/25	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/26	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/27	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/28	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/29	0	0	0	0	0	0	0		0	\$0	\$0	\$0	\$0	0	0	\$0	\$1	\$1	\$1	\$2	0	0	4	0.61	
6/30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	3	3	11	1.68		
7/1	8	10	0	0	0	0	4		0	0	0	0	0	0	0	0	0	0	0	0	2	26	3.98		
7/2	4	4	2	0	0	0	0		0	0	0	0	0	0	2	4	0	4	6	2	26	56	8.57		
7/3	2	6	-2	0	0	0	4		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7/4	\$13	\$9	\$18	\$4	\$5	\$2	\$11		\$1	\$4	\$0	\$0	\$0	\$0	\$3	\$2	\$0	\$3	\$3	\$1	\$13	92	14.07		
7/5	24	12	38	8	10	0	\$22		2	6	0	0	0	0	4	0	0	2	0	0	0	0	128	19.56	
7/6	\$14	-2	4	0	0	0	\$7		0	0	0	0	0	0	0	0	0	4	2	8	2	0	40	6.18	
7/7	3	5	4	5	0	4	7		0	3	3	1	0	-2	2	2	2	0	0	1	3	41	6.28		
7/8	-2	4	2	0	0	0	\$2		-2	0	2	-2	0	0	0	0	0	0	0	0	0	0	12	1.85	
7/9	0	0	0	0	0	0	\$2		0	0	-2	10	0	0	0	0	0	0	0	0	0	0	0	1.48	
7/10	0	0	0	0	0	0	\$1		0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0.74	
7/11	0	16	2	4	0	0	\$3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	5.63
7/12	2	2	4	0	0	0	\$0		2	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	0.99	
7/13	0	0	0	0	0	0	\$0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	
7/14	\$2	\$2	\$0	\$0	\$0	\$1	\$2		\$2	\$2	(\$1)	\$1	\$1	\$0	\$0	\$1	\$4	\$4	\$2	\$2	21	3.23			
7/15	3	3	0	0	0	0	1	3	4	3	-1	1	1	0	0	0	0	7	7	4	40	6.12			
7/16	2	4	0	2	0	2	\$4		6	0	0	6	6	2	0	0	0	0	0	0	10	2	48	7.28	
7/17	0	0	0	0	0	0	\$0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33	
7/18	0	4	0	8	0	0	\$0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	1.84
7/19	0	0	2	0	-2	0	\$0		0	0	0	0	0	0	2	2	2	4	0	-2	4	0	0	12	1.84
7/20	\$0	\$0	\$2	\$2	\$0	\$0	\$0		\$1	\$1	\$0	\$1	\$1	\$1	\$1	\$3	\$0	(\$1)	\$2	\$0	12	1.76			
7/21	0	0	2	3	2	0	0		0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	11	1.68
7/22	0	0	0	0	0	0	\$0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.31	
7/23	0	0	0	0	0	0	\$0		0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0.92	
7/24	0	0	0	0	0	0	\$0		-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-0.31
7/25	2	0	0	2	0	0	\$0		0	0	-2	0	0	2	-2	0	0	0	0	0	0	0	0	2	0.31
7/26	0	0	0	0	0	0	-2	\$0	0	0	0	0	0	0	0	0	-2	4	0	0	0	0	0	0.00	
TOTAL	76	79	78	38	15	16	63	13	21	7	19	17	15	18	26	27	28	45	57	653	100.0				
%	11.63	12.01	11.94	5.74	2.30	2.37	9.62	1.99	3.21	0.99	2.83	2.53	2.30	2.75	3.90	4.06	4.29	6.81	8.72	100.0	653				

Note: \$ equals calculated value.

Table 6. Expanded daily hourly pink salmon migration past Kwiniuk River counting tower, 1986.

DATE	HOUR	TOTAL																								%	
		0000	0100	0200	0300	0400	0500	6-12	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300							
6/19																											0.00
6/20	0	0	0	0	0	0	\$0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/21	0	0	0	0	0	0	\$0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
6/22	\$2	(\$2)	\$2	\$0	\$1	\$0	\$2	(\$3)	\$0	\$0	\$3	\$1	\$3	\$4	\$3	\$1	\$3	\$8	\$7	32	0.01						
6/23	3	-3	3	0	1	0	3	-5	0	0	6	2	5	7	6	2	6	15	13	64	0.03						
6/24	6	8	0	0	0	0	\$4	0	0	0	6	4	2	12	8	6	6	12	2	76	0.03						
6/25	6	14	14	6	0	2	\$2	2	0	-10	-6	-2	0	-2	-4	6	18	2	0	48	0.02						
6/26	4	-12	-4	0	0	0	\$1	4	0	2	-4	0	0	0	10	14	26	8	16	65	0.03						
6/27	8	-12	-12	0	2	-2	\$4	0	0	0	0	0	0	0	4	2	2	198	10	204	0.08						
6/28	56	82	62	2	6	6	\$15	10	2	0	0	14	4	-6	4	98	14	18	420	807	0.33						
6/29	192	\$83	\$89	\$7	\$18	\$13	\$17	0	\$4	\$3	\$0	\$8	8	\$40	\$30	\$65	\$21	\$35	284	913	0.38						
6/30	59	83	115	12	29	19	19	-10	6	6	0	1	2	85	55	32	28	51	439	1031	0.43						
7/1	1560	640	242	178	22	34	\$141	2	0	4	2	4	6	6	6	16	3600	1000	200	7663	3.17						
7/2	648	3040	1612	640	180	62	\$242	2	10	2	6	26	16	22	26	260	1240	2920	2190	13144	5.44						
7/3	1512	2112	1872	620	858	884	\$318	10	10	4	4	20	196	96	1236	710	2360	1260	3180	17262	7.15						
7/4	\$1,139	\$2,593	\$4,946	\$2,940	\$639	\$635	\$863	\$10	\$52	\$79	\$149	\$291	\$413	\$308	\$740	\$953	\$1,413	\$789	\$1,815	20767	8.60						
7/5	766	3074	8020	5260	420	386	\$1,408	10	94	154	294	562	630	520	244	1196	466	318	\$450	24272	10.05						
7/6	\$883	1176	518	66	218	294	\$1,014	4	14	38	152	710	410	1852	300	3424	1554	3210	1638	17475	7.24						
7/7	1000	348	233	45	97	215	582	58	63	748	720	610	557	1903	1861	228	19	247	497	10031	4.15						
7/8	466	1324	264	14	38	266	\$595	-44	12	82	36	-200	196	2088	3350	1076	496	84	106	10249	4.24						
7/9	194	94	-10	-18	-58	-46	\$149	8	0	-64	-8	-106	40	100	74	1148	372	334	360	2563	1.06						
7/10	1530	104	22	-2	-32	4	\$123	-8	-28	0	34	14	8	14	8	42	14	176	104	2127	0.88						
7/11	1332	2980	852	90	6	8	\$284	0	-2	4	2	106	400	186	4050	822	1400	3184	1030	16734	6.93						
7/12	786	656	170	38	34	22	\$62	-2	-10	-288	-10	-336	-14	380	76	296	1484	308	20	3672	1.52						
7/13	60	90	44	244	64	24	\$39	4	0	0	0	2	8	46	42	266	378	252	706	2269	0.94						
7/14	\$138	\$183	\$306	\$283	\$113	\$212	\$190	\$108	\$56	\$60	\$137	\$85	\$24	\$353	\$952	\$3,024	\$2,164	\$1,591	\$1,234	11210	4.64						
7/15	216	276	567	322	161	399	342	211	111	119	274	168	40	659	1862	5782	3950	2930	1762	20151	8.35						
7/16	1542	628	26	52	122	172	\$153	668	532	418	442	1066	876	94	234	-64	190	1020	834	9005	3.73						
7/17	862	270	128	76	8	78	\$91	20	18	-8	-2	104	62	84	150	650	418	1378	1000	5387	2.23						
7/18	432	1222	1642	96	14	20	\$1,088	12	10	18	48	42	60	576	182	100	36	28	704	6330	2.62						
7/19	1758	126	62	22	14	6	\$1,096	-76	-42	32	66	420	336	460	882	354	444	282	138	6380	2.64						
7/20	\$1,031	\$314	\$114	\$53	\$36	\$44	\$861	(\$36)	(\$17)	\$36	\$81	\$258	\$264	\$278	\$609	\$337	\$259	\$217	\$276	5012	2.08						
7/21	304	501	165	83	57	82	626	5	8	40	96	95	192	95	335	320	74	152	413	3643	1.51						
7/22	900	644	428	158	82	100	\$1,729	-4	8	36	82	68	1062	1972	1152	476	638	360	172	10063	4.17						
7/23	208	120	122	22	24	32	\$845	42	8	28	46	120	78	500	720	872	596	336	200	4919	2.04						
7/24	242	50	64	28	14	22	\$637	28	-14	36	34	72	118	178	116	256	616	508	702	3707	1.54						
7/25	824	174	142	110	68	64	\$386	0	8	8	-12	-4	-4	4	30	76	82	158	130	2244	0.93						
7/26	26	56	-2	18	8	40	\$331	0	-2	0	10	44	134	238	214	150	130	228	304	1927	0.80						
TOTAL	20695	23036	22816	11465	3262	4096	14263	1031	911	1587	2688	4268	6132	13150	19566	22996	24517	23616	21355	241446	100.00						
%	8.57	9.54	9.45	4.75	1.35	1.70	5.91	0.43	0.38	0.66	1.11	1.77	2.54	5.45	8.10	9.52	10.15	9.78	8.84	100.00	241446						

Note: \$ equals calculated value.

Table 7. Age and sex of chum salmon from the Moses Point commercial harvest, 1986.

	Age Class				
	3-1	4-1	5-1	6-1	Total 1/
Males	930	5,766	3,824	83	10,603
Percent	4.5	27.9	18.5	0.4	51.3
Sample Size	10	62	41	1	114
Females	661	4,382	5,022	0	10,065
Percent	3.2	21.2	24.3	0.0	48.7
Sample Size	7	47	54	0	108
Sexes Combined	1,591	10,148	8,846	83	20,668
Percent	7.7	49.1	42.8	0.4	100.0
Sample Size	17	109	95	1	222

1/ Total does not include fish not aged.

Table 8. Age and sex of beach seined chum salmon samples from Kwiniuk River, July 6 - July 10, 1986.

	Age Class				
	3-1	4-1	5-1	6-1	Total 1/
Males					
Percent	0.0	44.2	11.6	0.0	55.8
Sample Size	0	19	5	0	24
Females					
Percent	0.0	41.9	2.3	0.0	44.2
Sample Size	0	18	1	0	19
Sexes Combined					
Percent	0.0	86.1	13.9	0.0	100.0
Std. Error 1/ Sample Size	0	37	6	0	43

1/ Total does not include fish not aged.

Table 9. Daily water temperature and water level at Kwiniuk Tower, 1986

Date	Temperature f	Water Level in Inches
6/18	52	12.50
6/19	48	13.75
6/20	46	14.25
6/21	50	18.00
6/22	52	27.00
6/23	52	24.00
6/24	51	17.50
6/25	50	24.00
6/26	46	16.00
6/27	46	12.00
6/28	51	8.25
6/29	54	5.50
6/30	54	5.50
7/1	56	7.50
7/2	56	5.25
7/3	57	9.25
7/4	59	14.25
7/5	59	19.25
7/6	60	14.50
7/7	61	22.00
7/8	59	16.00
7/9	54	13.75
7/10	55	10.50
7/11	56	8.25
7/12	54	7.50
7/13	60	5.50
7/14	52	5.25
7/15	55	5.50
7/16	56	12.00
7/17	52	12.00
7/18	51	20.50
7/19	49	43.00
7/20	49	58.50
7/21	47	21.25
7/22	51	5.50
7/23	52	7.00
7/24	50	16.00
7/25	50	7.50
7/26	50	5.75
7/27	50	3.25
7/28	48	1.75
mean	53	14.06

Appendix Table 1. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1965	1966	1967	1968	1969
Chum	6/18	6				
	6/19		24			
	6/20		50			
	6/21		158			
	6/22		506			
	6/23		759			
	6/24		1,048	5		
	6/25		597	24	66	
	6/26		1,060	77	231	57
	6/27	218	1,189	270	1,066	113
	6/28	983	1,697	315	1,812	427
	6/29	2,576	1,768	1,455	2,838	571
	6/30	3,445	2,180	2,148	3,509	1,475
	7/01	7,741	3,728	2,739	4,443	2,057
	7/02	3,794	7,619	3,027	5,971	2,744
	7/03	9,988	8,054	3,491	5,914	3,861
	7/04	11,050	10,050	5,647	8,427	6,056
	7/05	12,078	11,958	6,157	9,409	7,137
	7/06	12,502	13,184	9,605	10,247	8,107
	7/07	13,445	13,703	13,088	12,428	9,314
	7/08	13,824	15,703	15,691	15,033	10,368
	7/09	15,630	17,703	18,513	16,720	11,727
	7/10	19,147	17,472	21,487	18,003	12,197
	7/11	22,518	19,551	23,459	18,284	12,577
	7/12	23,491	25,549	25,165	18,349	13,200
	7/13	26,444	27,225	26,473	18,415	14,198
	7/14	32,026	27,579	26,459	18,431	14,379
	7/15	32,190	28,604	26,532	18,564	15,057
	7/16	32,437	28,336	26,584	18,590	16,634
	7/17	32,503	28,384	26,398	18,601	17,117
	7/18	32,861	29,965	26,625	18,636	18,345
	7/19		31,884	26,631	18,760	18,707
	7/20		32,154	26,631	18,315	18,918
	7/21		32,389	26,561	18,347	19,233
	7/22		32,723		18,907	19,373
	7/23		32,938		18,951	19,390
	7/24		33,000		19,976	19,525
	7/25		33,137			19,534
	7/26		33,153			19,749
	7/27		33,153			
	7/28		33,184			
	7/29		33,182			
		1/ -6,227	1/ -396	1/ -2,217	1/ -163	1/ -62
		26,634	32,786	24,444	18,813	19,687

1/ Subsistence catch.

Appendix Table 1. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1970	1971	1972	1973	1974
Chum	6/18					
	6/19					16
	6/20					79
	6/21					80
	6/22					202
	6/23					479
	6/24					950
	6/25	2			11	1,113
	6/26	17	23		13	3,316
	6/27		31		17	5,047
	6/28		95	33	17	6,942
	6/29	645	139	51	17	8,358
	6/30	2,302	196	158	25	9,805
	7/01	3,327	452	597	97	11,266
	7/02	6,420	728	1,375	207	13,776
	7/03	14,467	1,181	1,607	402	15,674
	7/04	20,873	3,362	2,793	1,514	16,985
	7/05	26,699	4,783	4,143	4,545	17,972
	7/06	30,596	6,178	5,314	4,933	19,061
	7/07	31,468	6,531	9,277	3,075	19,479
	7/08	34,695	10,677	12,100	8,495	19,766
	7/09	40,012	11,539	14,384	8,870	20,126
	7/10	40,362	13,401	16,242	15,022	20,347
	7/11	44,180	16,902	17,537	15,337	21,633
	7/12	47,305	18,694	21,735	16,303	22,745
	7/13	47,738	19,346	22,997	16,776	23,682
	7/14	50,304	20,566	24,998	18,944	25,084
	7/15	56,943	20,858	25,389	19,666	31,243
	7/16	60,275	21,909	25,305	20,138	32,179
	7/17	62,577	26,955	26,133	22,396	32,570
	7/18	63,065	27,336	27,284	24,075	33,388
	7/19	63,624	30,680	27,993	25,227	33,891
	7/20	65,673	33,800	28,371	25,995	34,084
	7/21	65,717	34,473	28,502	27,304	34,209
	7/22	66,062	35,237	29,020	27,341	34,294
	7/23	66,176	35,510	29,458	27,570	34,676
	7/24	66,336	36,185	29,756	28,008	34,979
	7/25	66,545	36,959	29,995	28,029	35,130
	7/26	66,584	37,680	30,005		35,161
	7/27	66,599	38,107			
	7/28	66,602	38,186			
	7/29	66,604	38,243			

	1/	1/	1/	1/	1/
Expanded	x 2.1				
Escapement	1,400	803	631	588	738
Total	+ 66,604	+ 38,243	+ 30,053	+ 28,029	+ 35,151
Expanded	68,004	39,046	30,686	28,617	35,899
Escapement	- 367	2/			
		38,679			

1/ Subsistence catch.

2/ 1970 was the first year of 18-hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1965-1969 was 2.1% of the total escapement for chums.

Appendix Table 1. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1975	1976	1977	3/ 1978	3/ 1979
Chum	6/18					
	6/19					
	6/20					
	6/21					
	6/22					
	6/23					
	6/24					
	6/25					
	6/26					
	6/27			12		14
	6/28		6	271		188
	6/29		31	468		294
	6/30		33	678		1,923
	7/01		105	2,095		2,185
	7/02		134	2,924		2,316
	7/03		195	4,133		2,588
	7/04	72	428	4,607	591	2,842
	7/05	363	746	6,065	1,498	2,884
	7/06	728	884	7,049	3,163	3,228
	7/07	835	1,095	8,295	4,203	3,406
	7/08	985	1,515	11,949	5,320	3,594
	7/09	1,136	1,622	14,680	6,112	4,508
	7/10	1,446	1,776	16,207	6,812	5,216
	7/11	1,887	2,160	18,118	7,496	5,418
	7/12	2,046	2,639	19,264	8,754	5,528
	7/13	2,354	3,343	19,445	9,181	6,236
	7/14	3,430	3,459	19,867	9,448	6,866
	7/15	3,151	3,872	20,601	10,173	8,141
	7/16	7,395	4,239	20,716	10,470	9,196
	7/17	9,497	4,809	20,999	10,564	9,757
	7/18	10,443	4,899	21,245	10,830	8,910
	7/19	11,919	5,112	21,492	10,827	10,272
	7/20	12,676	5,419	21,643	10,891	10,688
	7/21	13,435	5,773	21,815	10,952	11,275
	7/22	13,809	6,021	22,083	10,957	11,938
	7/23	13,962	6,300	22,189		12,027
	7/24	14,033	6,384	22,255		12,069
	7/25	14,049	6,484	22,289		12,101
	7/26		6,675			
	7/27		6,732			
	7/28		6,770			
	7/29		6,804			
	7/30		6,813			
	7/31		6,834			
	8/01					
	8/02					

		1/ x 2.1	x 2.1	x 2.1	x 2.1	x 2.1
Expanded		295	143	468	230	254
Escapement	+ 14,049	+ 6,834	+ 22,289	+ 10,957	+ 12,101	
Total	14,344	6,977	22,757	11,187	12,355	
Expanded		- 511 2/				
Escapement		6,466		14,408 4/		

1/ Subsistence catch.

2/ 1970 was the first year of 18-hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1965-1969 was 2.1% of the total escapement for chums.

3/ Corrected figures. Expanded to compensate for missing hourly counts.

4/ Point estimates (range 13,698-15,120). Expanded figure to compensate for fish not counted before 7/04 and after 7/22.

Appendix Table 1. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1980	1981	1982	1983	1984
Chum	6/18					
	6/19		96		0	0
	6/20		154		86	0
	6/21		186	0	1,593	2
	6/22	0	465	365	2,939	35
	6/23	10	939	531	3,475	55
	6/24	54	2,375	560	5,785	328
	6/25	201	3,390	5,023	8,370	1,199
	6/26	339	4,510	8,831	9,223	3,419
	6/27	390	5,077	9,810	9,491	5,352
	6/28	639	5,137	10,305	12,463	6,821
	6/29	985	5,601	10,886	12,889	9,050
	6/30	1,099	6,989	11,638	13,857	14,806
	7/01	3,579	7,724	11,004	22,113	17,432
	7/02	3,529	7,927	12,522	22,272	22,412
	7/03	3,436	11,582	15,391	24,689	27,668
	7/04	3,651	13,466	18,335	26,233	29,909
	7/05	5,268	13,257	21,044	30,962	31,299
	7/06	6,721	15,058	21,562	33,107	35,121
	7/07	8,050	16,374	25,119	36,372	32,346
	7/08	10,965	16,714	28,678	41,130	33,639
	7/09	11,569	19,678	31,312	43,001	34,477
	7/10	12,103	20,203	31,639	44,608	40,328
	7/11	12,701	20,598	32,021	45,471	47,193
	7/12	13,800	22,783	33,674	45,743	48,631
	7/13	15,468	23,744	35,299	46,443	49,312
	7/14	15,222	25,529	35,783	46,681	50,361
	7/15	15,457	27,091	36,602	47,095	50,765
	7/16	15,750	27,933	36,941	48,204	51,131
	7/17	16,505	28,643	37,252	49,668	52,172
	7/18	17,161	29,546	38,041	49,831	52,206
	7/19	17,745	30,016	38,773	50,903	52,227
	7/20	18,272	31,219	39,989	52,685	52,376
	7/21	18,686	32,005	40,382	53,491	52,590
	7/22	18,771	32,195	40,582	53,916	52,605
	7/23	18,894	33,184	40,921	54,635	52,780
	7/24	18,931	33,757	40,899	54,858	52,852
	7/25	18,960	34,043	40,977	54,911	52,924
	7/26	18,964	34,123	41,073	54,986	
	7/27	18,971	34,231		55,107	
	7/28	18,974	34,231			
	7/29		34,269			
	7/30		34,288			
	7/31		34,299			
	8/01		34,307			
	8/02		34,310			

5/
34,561 5/
44,036 5/
56,907 5/
54,043

x 2.1

Expanded
Escapement + 18,974
Total 19,374

5/ Expanded using weekly 24-hour counts to compensate for
6 a.m.-12 Noon Counts.

**Appendix Table 1. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.**

Species	Date	1985	1986
Chum	6/18		
	6/19		0
	6/20		42
	6/21		44
	6/22		323
	6/23		879
	6/24		1137
	6/25		1017
	6/26	0	1101
	6/27	0	1396
	6/28	6	2771
	6/29	119	3807
	6/30	168	5035
	7/01	169	6325
	7/02	169	7888
	7/03	220	9642
	7/04	103	11299
	7/05	987	12860
	7/06	2563	14050
	7/07	3703	14601
	7/08	3332	15263
	7/09	2032	15493
	7/10	2255	15573
	7/11	3111	16888
	7/12	3945	16995
	7/13	4966	17170
	7/14	6139	18130
	7/15	6371	19874
	7/16	6996	20216
	7/17	7956	20603
	7/18	8153	20906
	7/19	8342	22126
	7/20	8434	22840
	7/21	8556	23047
	7/22	8626	23600
	7/23	8700	24038
	7/24	8800	24519
	7/25	8836	24649
	7/26	8907	24705
	7/27	8990	
	7/28	9013	
	7/29		
	7/30		
	7/31		
	8/01		
	8/02		
	8/03		

9013 5/ 24705 5/

5/ Expanded using weekly 24-hour counts to compensate for
6 a.m.-12 noon counts.

Appendix Table 2. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1965	1966	1967	1968	1969
Pink	6/18					
	6/19					
	6/20					
	6/21					
	6/22					
	6/23					
	6/24					
	6/25					
	6/26					17
	6/27					19
	6/28	174			48	41
	6/29	250			214	52
	6/30	220			534	117
	7/01	276		1	735	131
	7/02	314	11	3	1,330	232
	7/03	349	29	4	1,732	378
	7/04	396	317	6	2,501	1,165
	7/05	388	517		3,141	2,259
	7/06	390	533		4,777	3,974
	7/07	412	568	18	13,719	6,415
	7/08	588	607	45	38,560	8,683
	7/09	650	673	521	67,509	11,406
	7/10	820	683	718	81,776	12,684
	7/11	1,120	722	1,282	105,997	13,539
	7/12	1,526	758	926	112,984	15,447
	7/13	1,653	817	2,685	113,323	18,250
	7/14	2,856	898	3,138	113,247	19,379
	7/15	4,488	1,205	3,160	114,504	25,056
	7/16	7,301	1,008	3,320	115,018	27,850
	7/17	7,456	1,206	3,348	117,172	34,863
	7/18	7,571	1,771	3,380	121,392	37,840
	7/19	8,668	3,259	3,406	124,510	43,897
	7/20		3,864	3,432	125,848	47,625
	7/21		4,190	3,567	127,088	51,943
	7/22		5,558	3,587	128,002	54,177
	7/23		6,777		128,466	54,772
	7/24		7,843		129,052	55,741
	7/25		10,015			56,217
	7/26		10,691			57,497
	7/27		10,798			
	7/28		10,364			
	7/29					
		1/ -367 8,301	1/ -235 10,629	1/ -79 3,508	1/ -2,288 126,764	1/ -614 56,683

1/ Subsistence catch.

Appendix Table 2. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1970	1971	1972	1973	1974
Pink	6/18					
	6/19					
	6/20					1
	6/21					2
	6/22					39
	6/23					223
	6/24					464
	6/25	3			322	359
	6/26	13			831	1,513
	6/27	16			1,053	2,436
	6/28	17	9	15	1,276	3,455
	6/29	47	12	48	1,413	5,390
	6/30	198	31	513	1,575	8,506
	7/01	298	125	1,490	1,762	10,047
	7/02	465	182	2,780	1,854	12,512
	7/03	1,096	241	2,899	1,938	14,668
	7/04	4,643	552	4,210	2,190	17,674
	7/05	10,949	819	7,564	3,491	19,180
	7/06	20,413	1,221	10,521	3,556	21,600
	7/07	20,159	1,327	21,264	3,631	22,668
	7/08	25,359	2,343	27,662	4,795	23,385
	7/09	30,729	2,490	35,297	4,979	23,781
	7/10	31,459	3,061	39,082	7,079	24,187
	7/11	39,601	3,963	42,529	7,327	24,764
	7/12	50,921	6,462	47,520	8,539	25,604
	7/13	52,800	6,994	49,581	9,251	25,840
	7/14	59,521	7,418	52,553	12,512	29,336
	7/15	90,681	7,519	53,539	13,393	33,294
	7/16	127,335	7,732	53,923	14,569	34,160
	7/17	148,750	9,646	54,483	18,347	34,302
	7/18	155,935	10,401	55,674	21,214	35,690
	7/19	161,963	12,470	57,721	27,748	36,313
	7/20	179,160	13,938	57,698	30,789	36,920
	7/21	185,247	14,571	57,997	32,842	37,086
	7/22	198,958	15,123	59,024	33,249	37,298
	7/23	208,403	15,309	59,576	35,112	38,101
	7/24	214,233	15,485	59,892	36,956	38,668
	7/25	222,209	15,638	60,147	37,070	39,263
	7/26	225,546	15,318	60,246		39,375
	7/27	226,712	15,996	60,256		
	7/28	226,329	16,089			
	7/29	226,331	16,151			

	2/	2/	2/	2/	2/
	x 3.66	x 3.66	x 3.66	x 3.66	x 3.66
	8,300	59	2,205	1,356	1,441
Expanded	226,831	+ 16,151	+ 60,256	+ 37,070	+39,375
Escapement	235,131	16,742	62,461	38,426	40,816
	-	108	1/		
Total expanded escapement		16,534			

1/ Subsistence catch.

2/ 1970 was the first year of the 18-hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1963-1969 was 3.66% of the total escapement for pink salmon.

Appendix Table 2. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1975	1976	1977	1978	1979
Pink	6/18					
	6/19					
	6/20					
	6/21					
	6/22					
	6/23					
	6/24					
	6/25					
	6/26					
	6/27			17		
	6/28		213	35		17
	6/29		406	116		17
	6/30		439	191		213
	7/01		702	313		572
	7/02		781	491		605
	7/03		1,004	592		1,051
	7/04		1,756	699	98	1,531
	7/05		2,763	884	460	1,662
	7/06	79	3,300	1,240	1,473	2,683
	7/07	185	4,229	2,037	2,341	5,062
	7/08	176	5,869	2,707	3,142	6,547
	7/09	294	6,942	5,478	4,487	9,744
	7/10	584	8,034	9,435	7,227	12,745
	7/11	820	9,903	21,882	9,475	14,356
	7/12	959	11,105	27,876	18,087	15,615
	7/13	1,001	14,384	30,466	26,128	20,113
	7/14	1,013	14,982	33,086	28,619	27,872
	7/15	1,304	16,072	37,508	37,930	44,290
	7/16	1,770	16,947	38,005	41,055	63,390
	7/17	2,529	19,185	39,530	45,077	75,904
	7/18	5,183	19,692	40,232	52,343	82,253
	7/19	10,772	20,121	40,926	54,786	100,508
	7/20	22,354	20,956	41,480	60,573	113,462
	7/21	38,220	22,084	42,361	60,273	134,349
	7/22	45,466	23,038	43,467	69,719	153,686
	7/23	50,902	24,663	44,236		158,229
	7/24	52,935	25,170	44,479		160,871
	7/25	54,858	25,710	44,602		161,578
	7/26	55,293	26,411			
	7/27		27,045			
	7/28		27,333			
	7/29		27,549			
	7/30		28,063			
	7/31		28,307			
	8/01		28,431			
x 3.66						
2,024						
Expanded + 55,293						
1,040						
1,632						
2,551						
5,914						
3/						
Escapement 57,317						
29,471						
46,234						
72,270						
167,492						
3/						
Total expanded escapement 28,087						
75,993						

1/ Subsistence catch.

3/ Corrected figure. Expanded to compensate for missing hourly counts.

4/ Expanded to compensate for an estimated 9% of total pink escapement not counted after 7/22.

Appendix Table 2. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1980	1981	1982	1983	1984
Pink	6/18					
	6/19		16		0	0
	6/20		54		0	33
	6/21		30	3	0	64
	6/22	0	48	154	0	88
	6/23	3	95	217	0	113
	6/24	20	289	271	0	205
	6/25	34	446	5,529	38	797
	6/26	43	674	15,802	148	2,751
	6/27	48	890	27,587	149	6,071
	6/28	75	1,007	30,879	201	7,317
	6/29	116	1,294	35,558	230	8,672
	6/30	130	1,754	42,847	299	18,269
	7/01	812	2,118	49,219	2,031	34,868
	7/02	601	2,452	41,678	2,111	81,178
	7/03	708	4,015	65,649	3,083	132,368
	7/04	1,323	6,999	104,728	3,551	146,574
	7/05	2,561	6,883	137,005	6,297	146,611
	7/06	3,952	12,077	146,918	8,737	152,727
	7/07	7,476	16,246	206,405	13,713	146,918
	7/08	35,832	20,240	253,648	22,480	149,749
	7/09	41,967	33,601	296,453	40,765	153,389
	7/10	53,421	36,436	309,917	60,491	167,203
	7/11	62,417	42,353	323,477	75,187	291,586
	7/12	78,464	56,464	348,835	83,198	374,831
	7/13	115,995	65,414	368,129	91,539	421,553
	7/14	111,660	82,109	378,864	93,458	515,926
	7/15	119,532	103,658	386,968	95,169	562,886
	7/16	130,144	136,304	390,615	100,649	592,149
	7/17	160,738	171,869	395,705	114,915	621,959
	7/18	187,484	203,372	402,228	119,806	625,224
	7/19	226,843	221,204	408,311	139,828	627,148
	7/20	254,669	269,584	419,628	165,085	631,244
	7/21	285,090	311,694	426,023	190,667	641,510
	7/22	291,675	338,697	428,166	204,997	643,277
	7/23	299,332	406,350	429,375	234,712	651,574
	7/24	301,695	485,775	429,537	247,211	658,754
	7/25	305,246	533,035	431,602	248,979	663,533
	7/26	307,044	536,815	433,395	251,825	
	7/27	308,736	542,727		254,538	
	7/28	309,077	542,419			
	7/29		545,815			
	7/30		547,424			
	7/31		549,059			
	8/01		549,776			
	8/02		550,283			

x 3.66

11,312 5/ 5/ 5/ 5/
Expanded Total +309,077 566,417 469,674 251,965 736,544

Escapement 320,389

5/ Expanded using weekly 24-hour counts to compensate for
6 a.m.-12 noon counts.

Appendix Table 2. Daily total cumulative salmon escapement,
Kwiniuk River, 1965-1986.

Species	Date	1985	1986
Pink	6/18		
	6/19		0
	6/20		0
	6/21		0
	6/22		32
	6/23		96
	6/24		172
	6/25		220
	6/26	0	285
	6/27	6	489
	6/28	18	1296
	6/29	73	2209
	6/30	90	3240
	7/01	92	10903
	7/02	92	24047
	7/03	94	41309
	7/04	110	62076
	7/05	222	86349
	7/06	452	103824
	7/07	1054	113855
	7/08	1045	124103
	7/09	163	126666
	7/10	296	128793
	7/11	649	145527
	7/12	1225	149200
	7/13	2830	151468
	7/14	6521	162678
	7/15	7483	182829
	7/16	9357	191834
	7/17	12045	197221
	7/18	12896	203551
	7/19	13793	209931
	7/20	14589	214943
	7/21	15396	218586
	7/22	15806	228649
	7/23	16046	233568
	7/24	16350	237275
	7/25	16630	239519
	7/26	17075	241446
	7/27	17804	
	7/28	18237	
	7/29		
	7/30		
	7/31		
	8/01		
	8/02		

18237 5/ 241446 5/

5/ Expanded using weekly 24-hour counts to compensate for
6 a.m.-12 noon counts.

Appendix Table 3. Kwiniuk River counting tower escapement rates, chum salmon, 1965-1986.

DATE	Cumulative Total	Cumulative %
6/18	6	0.00
6/19	142	0.02
6/20	417	0.07
6/21	2069	0.33
6/22	4853	0.76
6/23	7150	1.12
6/24	12076	1.90
6/25	22269	3.50
6/26	33414	5.25
6/27	40745	6.41
6/28	52145	8.20
6/29	63735	10.02
6/30	82293	12.94
7/1	111575	17.54
7/2	133398	20.98
7/3	165800	26.07
7/4	198989	31.29
7/5	232631	36.58
7/6	263535	41.44
7/7	284034	44.66
7/8	331476	52.12
7/9	363798	57.20
7/10	394813	62.08
7/11	428314	67.35
7/12	459342	72.23
7/13	479292	75.36
7/14	503191	79.12
7/15	530734	83.45
7/16	544951	85.69
7/17	565888	88.98
7/18	578411	90.95
7/19	593863	93.38
7/20	608464	95.67
7/21	615376	96.76
7/22	620748	97.60
7/23	625953	98.42
7/24	630764	99.18
7/25	633141	99.55
7/26	634859	99.82
7/27	635600	99.94
7/28	635778	99.97
7/29	635906	99.99
7/30	635978	100.00
7/31	635962	100.00
8/1	635982	100.00

Appendix Table 4. Kwiniuk River counting tower escapement rates, chum salmon, for the "early years": 1974, 1978-79, 1981-84, 1986.

Date	Daily Total	Daily %	Cumulative %
6/18	0	0.00	0.00
6/19	112	0.04	0.04
6/20	249	0.09	0.13
6/21	1544	0.58	0.71
6/22	2436	0.91	1.62
6/23	2034	0.76	2.38
6/24	4778	1.78	4.16
6/25	10016	3.73	7.89
6/26	10414	3.88	11.77
6/27	5820	2.17	13.94
6/28	8540	3.18	17.12
6/29	6283	2.34	19.46
6/30	12186	4.54	24.00
7/1	14018	5.22	29.23
7/2	11076	4.13	33.36
7/3	18143	6.76	40.12
7/4	12450	4.64	44.76
7/5	12138	4.52	49.28
7/6	12578	4.69	53.97
7/7	7578	2.82	56.79
7/8	13488	5.03	61.82
7/9	10898	4.06	65.88
7/10	10023	3.74	69.61
7/11	11995	4.47	74.08
7/12	8148	3.04	77.12
7/13	6214	2.32	79.44
7/14	6815	2.54	81.98
7/15	13102	4.88	86.86
7/16	5164	1.92	88.78
7/17	4959	1.85	90.63
7/18	3447	1.28	91.92
7/19	4359	1.62	93.54
7/20	5736	2.14	95.68
7/21	3179	1.18	96.86
7/22	2134	0.80	97.66
7/23	3131	1.17	98.83
7/24	1671	0.62	99.45
7/25	830	0.31	99.76
7/26	345	0.13	99.89
7/27	229	0.09	99.97
7/28	0	0.00	99.97
7/29	38	0.01	99.99
7/30	19	0.01	99.99
7/31	11	0.00	100.00
8/1	8	0.00	100.00
Total	268337	100.00	

APPENDIX TABLE 5. KWINIUK RIVER COUNTING TOWER ESCAPEMENT RATES. CHUM SALMON "NORMAL" TIMING, 1966, 1968, 1969, 1970, 1972, 1976, 1977, 1980.

Date	Chum Total	Chum %	@ 20,000	@ 25,000	@ 30,000
6/18	0	0	0	0	0
6/19	24	00.01	2	3	3
6/20	50	00.03	6	8	9
6/21	158	00.08	16	20	24
6/22	506	00.26	52	65	78
6/23	769	00.39	78	98	117
6/24	1102	00.56	112	140	168
6/25	869	00.44	88	110	132
6/26	1653	00.83	166	208	249
6/27	2664	01.34	268	335	402
6/28	4470	02.25	450	563	675
6/29	6805	03.43	686	885	1029
6/30	9980	05.03	1006	1258	1509
7/1	20047	10.11	2022	2528	3033
7/2	28046	14.15	2830	3538	4245
7/3	38882	19.61	3922	4903	5883
7/4	50909	25.68	5136	6420	7704
7/5	64402	32.49	6498	8213	9747
7/6	74140	37.40	7480	9350	11220
7/7	84489	42.62	8524	10655	12786
7/8	102183	51.55	10310	12888	15465
7/9	116926	58.98	11796	14745	17694
7/10	122412	61.75	12350	15438	18525
7/11	132790	66.99	13398	16748	20097
7/12	148923	75.12	15024	18780	22536
7/13	154948	78.16	15632	19540	23448
7/14	160200	80.81	16162	20203	24243
7/15	169957	85.74	17148	21435	25722
7/16	174044	87.80	17560	21950	26340
7/17	178857	90.23	18046	22558	27069
7/18	182618	92.12	18424	23030	27636
7/19	186685	94.17	18834	23543	28251
7/20	190733	96.22	19244	24055	28866
7/21	192122	96.92	19384	24230	29076
7/22	193981	97.85	19570	24463	29355
7/23	195304	98.52	19704	24630	29556
7/24	197067	99.41	19882	24853	29823
7/25	197786	99.77	19954	24943	29931
7/26	198046	99.91	19982	24978	29973
7/27	198125	99.95	19990	24988	29985
7/28	198200	99.98	19996	24995	29994
7/29	198234	100.00	20000	25000	30000

Appendix Table 6. Kwiniuk River counting tower escapement rates, chum salmon, for "late years": 1971, 1973, 1975, 1985.

Date	Daily Total	Daily %	Cumulative %
6/25	11	0.01	0.01
6/26	25	0.03	0.04
6/27	32	0.04	0.08
6/28	50	0.06	0.13
6/29	135	0.15	0.28
6/30	67	0.07	0.36
7/01	327	0.36	0.72
7/02	386	0.43	1.15
7/03	699	0.78	1.93
7/04	3,468	3.86	5.78
7/05	5,407	6.01	11.79
7/06	3,724	4.14	15.93
7/07	1,862	2.07	18.00
7/08	7,225	8.03	26.03
7/09	894	0.99	27.03
7/10	8,545	9.50	36.53
7/11	5,105	5.68	42.20
7/12	3,745	4.16	46.37
7/13	2,452	2.73	49.09
7/14	5,602	6.23	55.32
7/15	2,967	3.30	58.62
7/16	4,373	4.86	63.48
7/17	10,337	11.49	74.97
7/18	3,697	4.11	79.08
7/19	6,658	7.40	86.48
7/20	4,736	5.27	91.75
7/21	1,861	2.07	93.82
7/22	1,245	1.38	95.20
7/23	728	0.81	96.01
7/24	1,283	1.43	97.44
7/25	846	0.94	98.38
7/26	791	0.88	99.26
7/27	509	0.57	99.82
7/28	102	0.11	99.94
7/29	57	0.06	100.00

Appendix Table 7. Kwiniuk River counting tower escapement rates pink salmon, 1979-1986.

Date	Cumulative Total	Cumulative %
6/19	16	0.00
6/20	87	0.00
6/21	151	0.01
6/22	322	0.01
6/23	524	0.02
6/24	957	0.04
6/25	4064	0.15
6/26	20183	0.77
6/27	35928	1.36
6/28	41563	1.58
6/29	48894	1.86
6/30	67554	2.57
7/1	92129	3.50
7/2	153280	5.82
7/3	248790	9.45
7/4	327397	12.43
7/5	388597	14.76
7/6	432202	16.41
7/7	511260	19.42
7/8	614175	23.33
7/9	704063	26.74
7/10	770612	29.27
7/11	956944	36.34
7/12	1109107	42.12
7/13	1238305	47.03
7/14	1380237	52.42
7/15	1503937	57.12
7/16	1615492	61.36
7/17	1751303	66.51
7/18	1837783	69.80
7/19	1948506	74.00
7/20	2084134	79.15
7/21	2224235	84.48
7/22	2305873	87.58
7/23	2430103	92.29
7/24	2538381	96.41
7/25	2601032	98.79
7/26	2619528	99.49
7/27	2624653	99.68
7/28	2625119	99.70
7/29	2628515	99.83
7/30	2630124	99.89
7/31	2631759	99.95
8/1	2632476	99.98
8/2	2632983	100.00